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ABSTRACT

Designed to develop creativity in young learners, this book contains interdisciplinary activities which focus on the theme of scientists. Activity pages are provided that can serve as front and back covers of a student booklet and the suggested activities can be duplicated for insertion between the covers resulting in a booklet for each student. A teacher/parent guide is included and supplies background information, activity descriptions, materials needed, and possible answers for the activities. A variety of exercises address the topics of: (1) what scientists do; (2) the instruments of science; (3) inventions and discoveries; (4) and the study of the earth, moon, stars, sea and weather. (ML)

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A GOOD APPLE [illegible] BOOK FOR INTERMEDIATE GRADES

GOOD GA APPLE

YOUNG SCIENTISTS EXPLORE

The World Around Them

BOOK 1 INTERMEDIATE LEVEL

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Young Scientists Explore

THE WORLD AROUND THEM

Book 1 - Intermediate Level

by **JERRY DEBRUIN**

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PREFACE

A NOTE TO TEACHERS AND PARENTS

Dear Friends,

Thank you for the many kind comments concerning my previous book, *Creative Hands-On Science Experiences* (CHOSE) published by Good Apple, Inc., in 1980.

This book, *Young Scientists Explore the World Around Them*, is written as a result of your comments and suggestions, comments that suggested a need for a handy science book or series of books that contains activity sheets which could be duplicated for students' use. *Young Scientists Explore the World Around Them* is an attempt to meet this need. The book is the first in a series that features science activity sheets which provide youngsters with a variety of interesting and challenging science-related experiences using puzzles, cutouts, hidden pictures, grids, charts and seek-a-words. Youngsters are encouraged to gain firsthand experience with objects before doing the written activity, for it is through firsthand experience that meaningful learning occurs. Emphasis throughout the book is placed on the development of creativity in the learner. It is hoped that this creativity will be nurtured both during and after the activities are done.

You as teachers and parents who use *Young Scientists Explore the World Around Them* are encouraged to make duplicating masters and transparencies from its pages. The activities are interdisciplinary in nature and are meant to integrate and extend existing science instruction with other academic areas. To achieve this purpose, the book contains Teacher/Parent Guides that supply background information including the title, major concept, materials needed for each activity plus a brief description of how to teach the activity and possible answers. When completed and mounted on single-layered cardboard and bound with tape, activity pages 2 and 26 make up the front and back covers of the Student Booklet. Completed student activity sheets can then be inserted between these covers with the result being a permanent Student Booklet for each youngster.

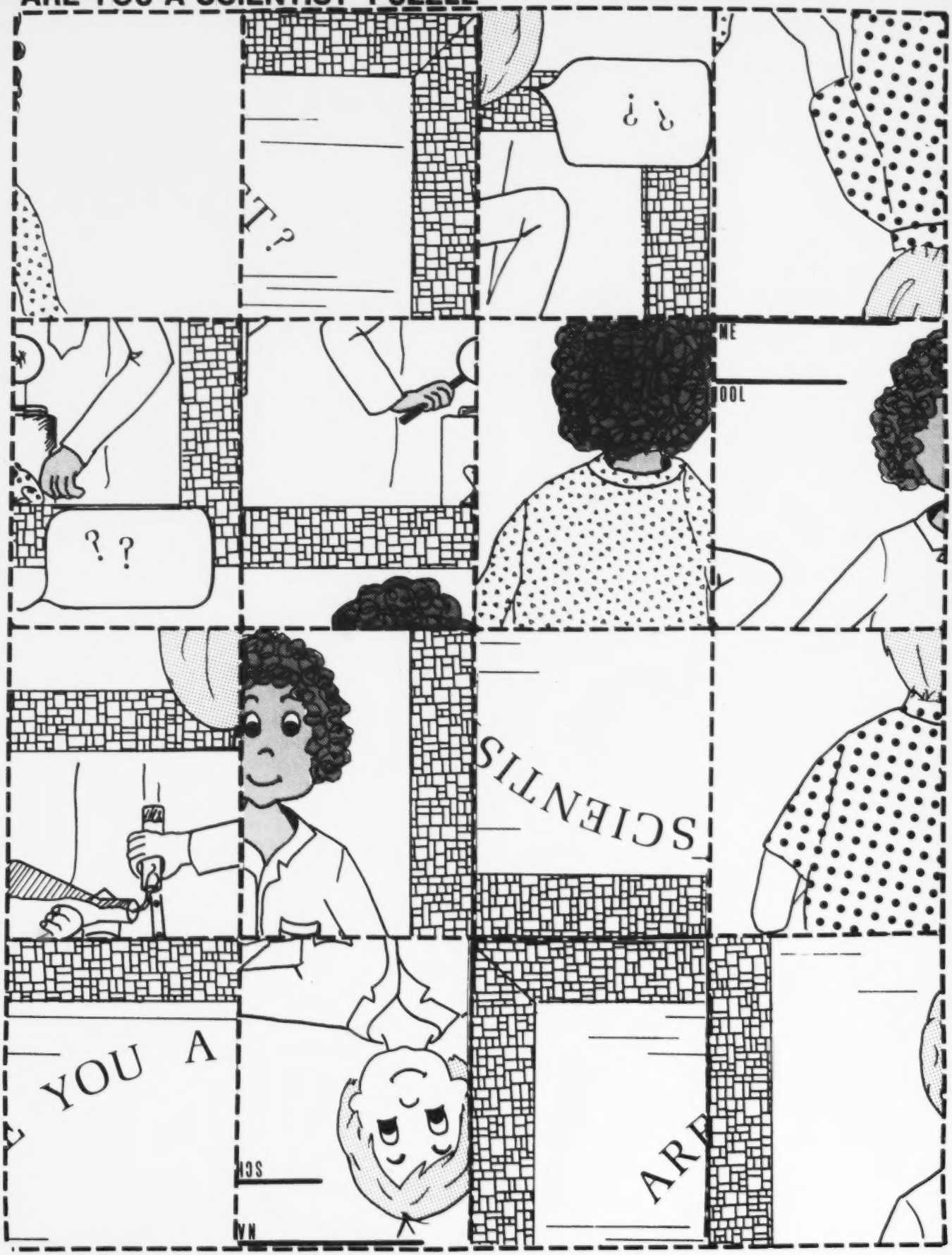
It is hoped that these activity sheets will touch many minds, hearts, and hands and that personal growth is experienced by all who do the activities. Keep in touch. Let me know how you are doing. It is always good to hear from you. Until then, best wishes in your continued growth as a scientist and complete human being.

Sincerely,

Jerry DeBruin

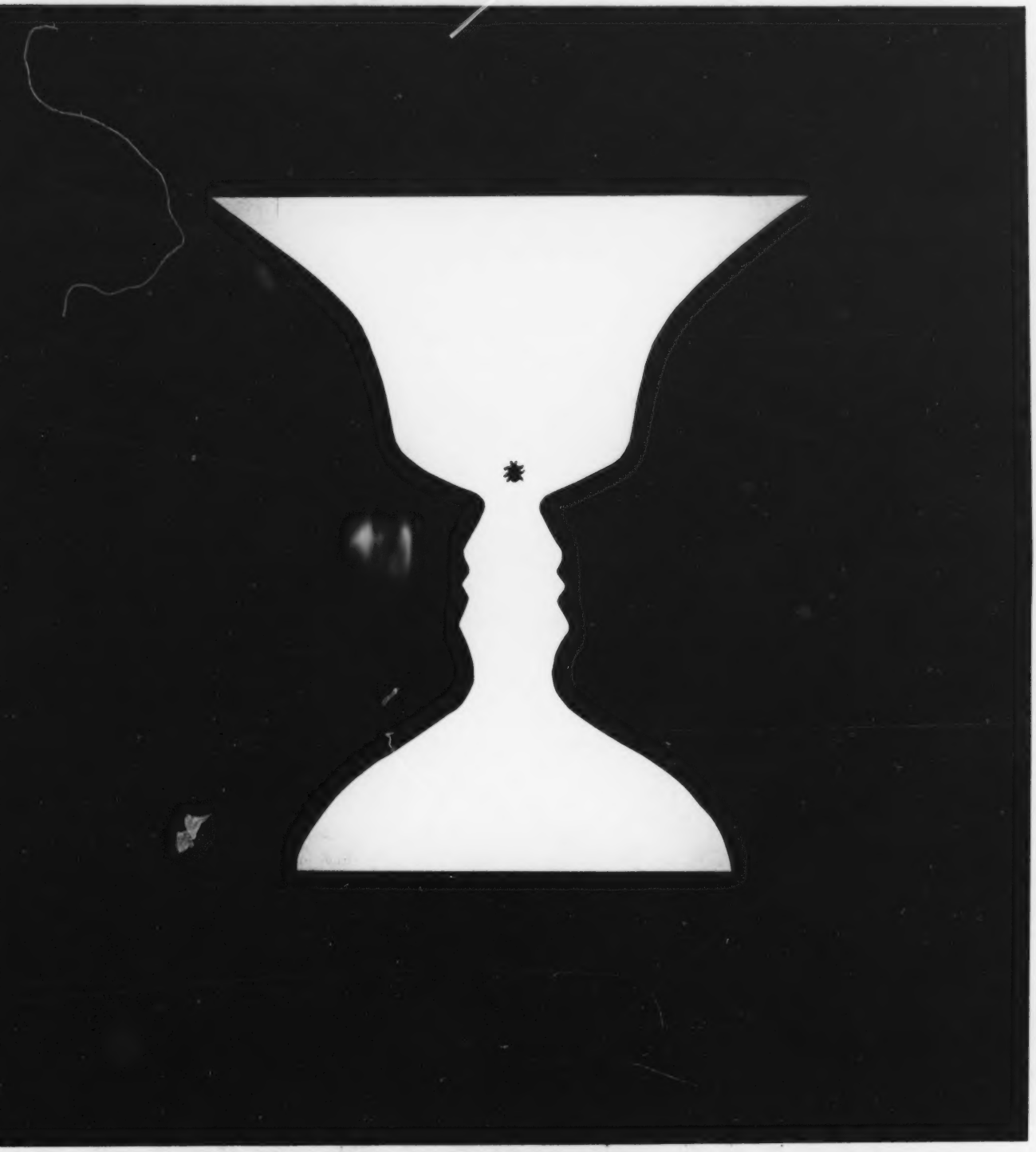
Jerry DeBruin

ARE-YOU-A-SCIENTIST PUZZLE



SCIENTISTS ARE CREATIVE

Stare at the insect between the two noses for 60 seconds. Count the number of reversals, first seeing the two faces and then the vase. Keep accurate records of the number of reversals during a period of time. Some people feel that a more creative person has a greater number of reversals than a less creative person. Do a study of the number of reversals for you and your classmates. Keep records of your results. Can you increase the number of reversals and thus increase your degree of creativity over a period of time?



SCIENTISTS ARE SPECIAL PEOPLE

Draw a line from the special name for the scientist to the object that the scientist studies. Then, put your name under the picture "My Name." Make a sketch in the circle "My Field" of what you as a scientist might like to study. Draw a line that connects your picture with your favorite science field and name that field.

MY FIELD

GEOLOGIST

PALEONTOLOGIST

ASTRONOMER

ORNITHOLOGIST

PHYSICIST

METEOROLOGIST

BIOLOGIST

BOTANIST

CHEMIST

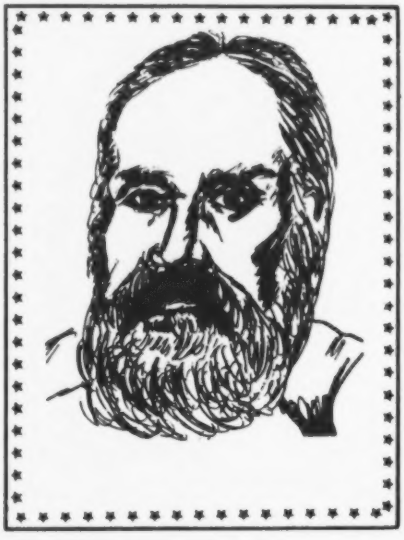
HERPETOLOGIST

ZOOLOGIST

OCEANOGRAPHER

ICHTHYOLOGIST

SOME SCIENTISTS ARE FAMOUS...

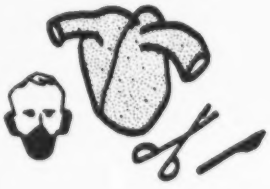


FOR THEIR...

I AM FAMOUS FOR

being the father
of modern astronomy.

I AM FAMOUS FOR



human heart
surgery.

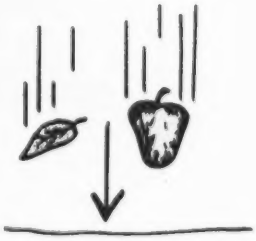
I AM FAMOUS FOR

discovering
condensed milk.

I AM FAMOUS FOR

discovering
plant genetics.

I AM FAMOUS FOR



studying
gravity and motion.

WORKS!

I AM FAMOUS FOR

my work
with peanuts and
sweet potatoes.

I AM FAMOUS FOR

discovering
the telescope.

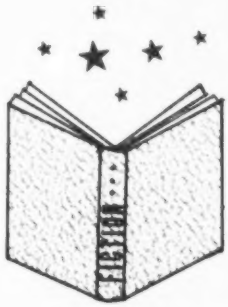
I AM FAMOUS FOR

soybean chemistry.

I AM FAMOUS FOR

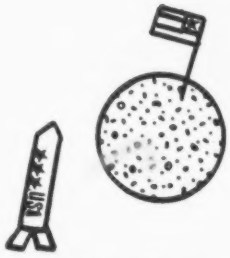
being the first
man to reach the
North Pole.

I AM FAMOUS FOR



writing
science fiction.

I AM FAMOUS FOR



being the first
U. S. astronaut.
I walked on the moon.

I AM FAMOUS FOR

being a prominent
astronomer.

I AM FAMOUS FOR

discovering
the element radium
and the x-ray.

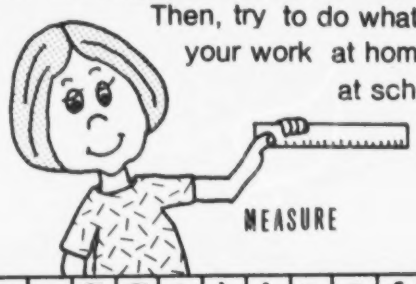
★DIRECTIONS

Cut out the pictures of the 13 famous scientists. Make deck of cards. Cut out pictures of ideas that represent what the scientists are famous for. Make deck of cards for these. Paste each card to stiff cardboard. Identify each scientist and write his name under the picture. Match card showing scientist with the idea. Play Concentration.

Things Scientists Do

Find the words hidden in the squares below that best describe what scientists are doing in the pictures. The words go across, up, down, diagonally, forward and backward. Circle each word as you find it. Then, try to do what a scientist actually does in your work at home or at school.

OBSERVE



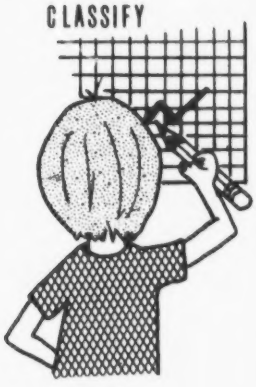
MEASURE

TEST

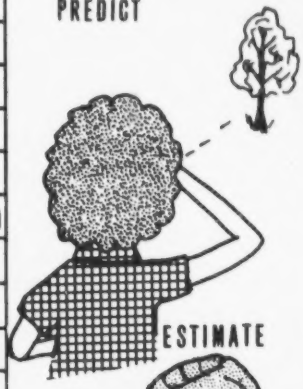
PREDICT

a	s	w	q	g	e	i	t	z	r	f	k	r	y	v	n
a	h	u	k	t	r	n	c	d	h	e	j	r	m	o	h
k	b	m	e	a	s	u	r	e	c	y	c	t	u	s	y
s	j	g	k	n	k	a	i	b	s	b	t	o	d	w	e
k	r	l	s	c	z	i	n	t	h	g	h	y	r	f	s
f	r	q	e	u	g	r	a	p	h	l	i	r	v	d	n
k	p	h	w	l	v	q	o	a	u	q	n	o	t	m	t
y	c	x	e	e	t	o	p	z	w	o	k	c	a	r	e
e	r	o	a	s	f	d	b	z	p	b	d	f	r	c	h
x	l	n	e	t	x	h	f	s	r	e	s	z	c	h	j
s	z	t	q	i	s	w	f	o	e	h	o	w	h	n	m
n	e	p	s	m	u	u	m	d	d	r	t	r	a	e	s
y	j	a	h	a	c	u	n	a	i	e	v	f	r	b	u
s	f	t	w	t	m	o	q	v	c	g	o	e	l	i	h
v	r	i	o	e	i	z	a	e	t	x	m	c	e	r	c
m	d	p	s	t	s	i	d	j	e	r	r	y	n	c	q
j	s	w	s	s	i	n	u	g	h	c	s	n	e	s	o
y	i	e	p	q	a	e	r	a	p	m	o	c	i	e	w
b	u	g	e	n	o	l	n	q	s	l	l	i	n	d	a
q	e	d	l	s	x	o	c	l	o	v	e	g	u	x	r

CLASSIFY



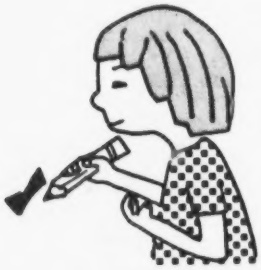
GRAPH



ESTIMATE

COMPARE

QUESTION



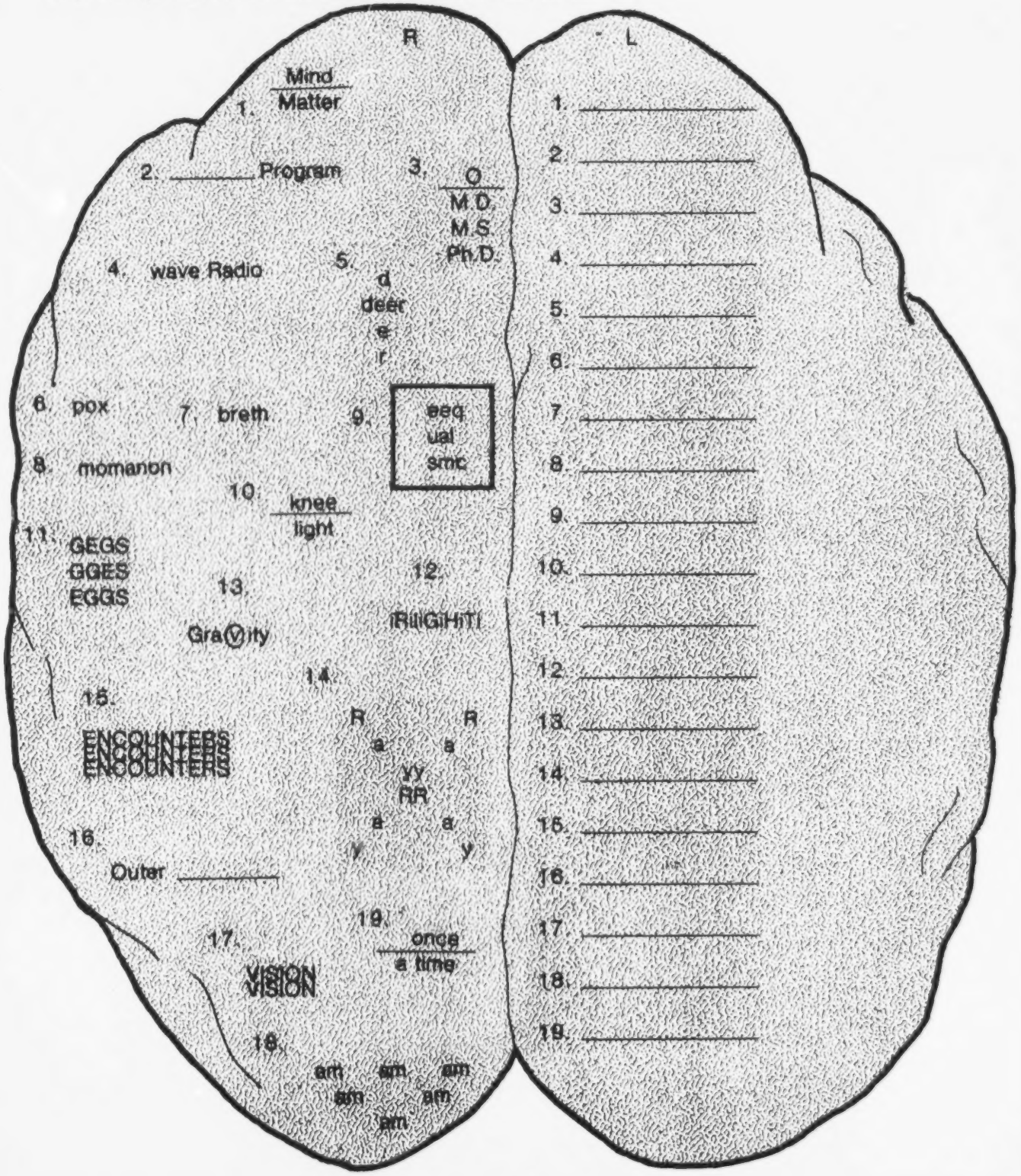
CHECK

RECORD

THINK

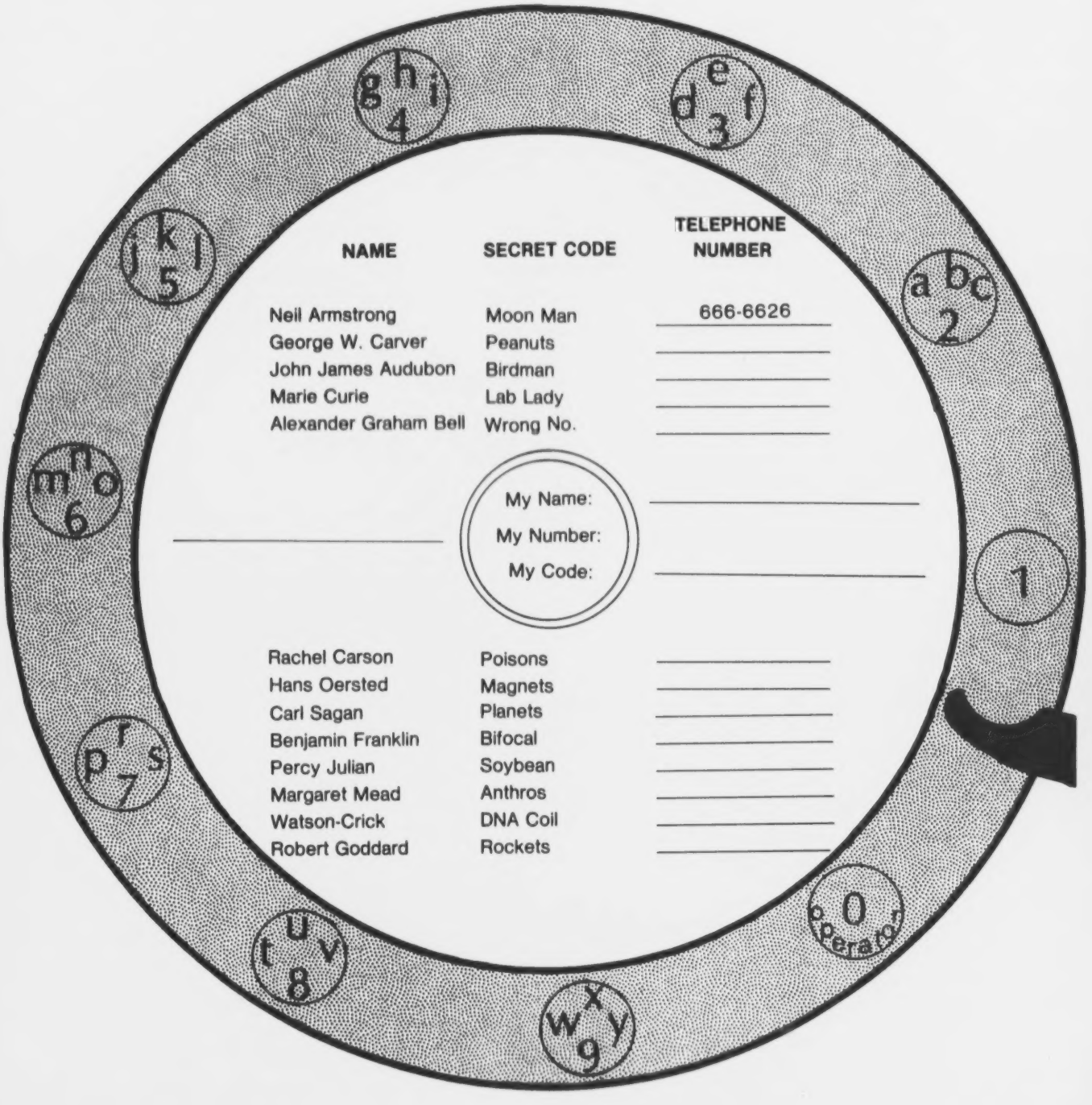
Scientists S-T-R-E-T-C-H Their Minds

This exercise will test your ability to stretch your mind a bit so you can become a Master Scientist. Below is a top view of a human brain. Identify the idea in the right hemisphere. Then write your response to that idea in the blank in the left hemisphere.



Scientists Remember Many Things

Scientists often use secret code names to remember important scientific events including their own phone numbers. Given the name of the scientist and his secret code, write the telephone number in the blank at the right. The first one is done for you. Then, enter your secret code and telephone number in the center of the dial. Add other names and numbers to the list. Find out more about what each secret code tells about that scientist.



NAME	SECRET CODE	TELEPHONE NUMBER
Neil Armstrong	Moon Man	666-6626
George W. Carver	Peanuts	
John James Audubon	Birdman	
Marie Curie	Lab Lady	
Alexander Graham Bell	Wrong No.	

My Name: _____

My Number: _____

My Code: _____

Rachel Carson	Poisons	
Hans Oersted	Magnets	
Carl Sagan	Planets	
Benjamin Franklin	Bifocal	
Percy Julian	Soybean	
Margaret Mead	Anthros	
Watson-Crick	DNA Coil	
Robert Goddard	Rockets	

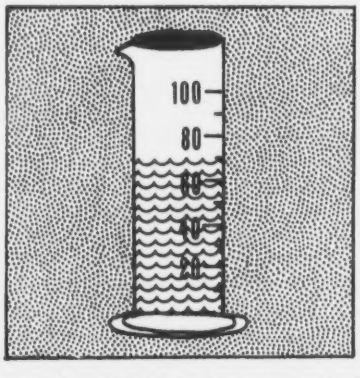
SCIENTISTS FOLLOW DIRECTIONS, CAN YOU?

NAME _____

Read all directions first before making any mark on this paper.

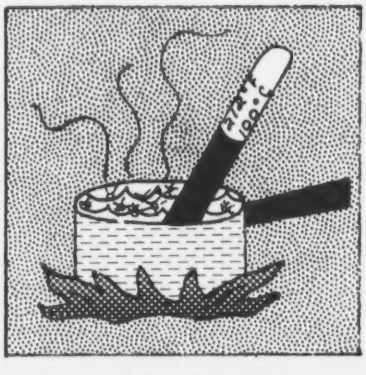
DIRECTIONS: Carefully read all the directions found on this page before making any marks on the paper. Read all task cards first before doing any of the tasks. Use a pen only.

TASK 1



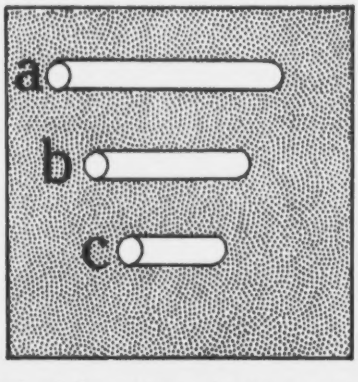
Color the amount of liquid in the graduated cylinder blue. Then write the number of ml of liquid in this space.
_____ ml

TASK 2



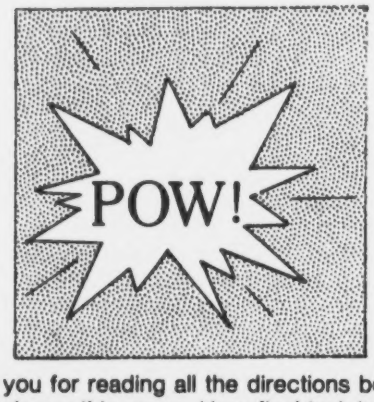
The water in the pan is boiling. The thermometer reads _____ °F or _____ °C.

TASK 3



Measure each of the pieces of tubing to the nearest inch (centimeter). Record your answers below: (a) ___in. ____cm, (b) ____in. ____cm, (c) ____in. ____cm.

TASK 4



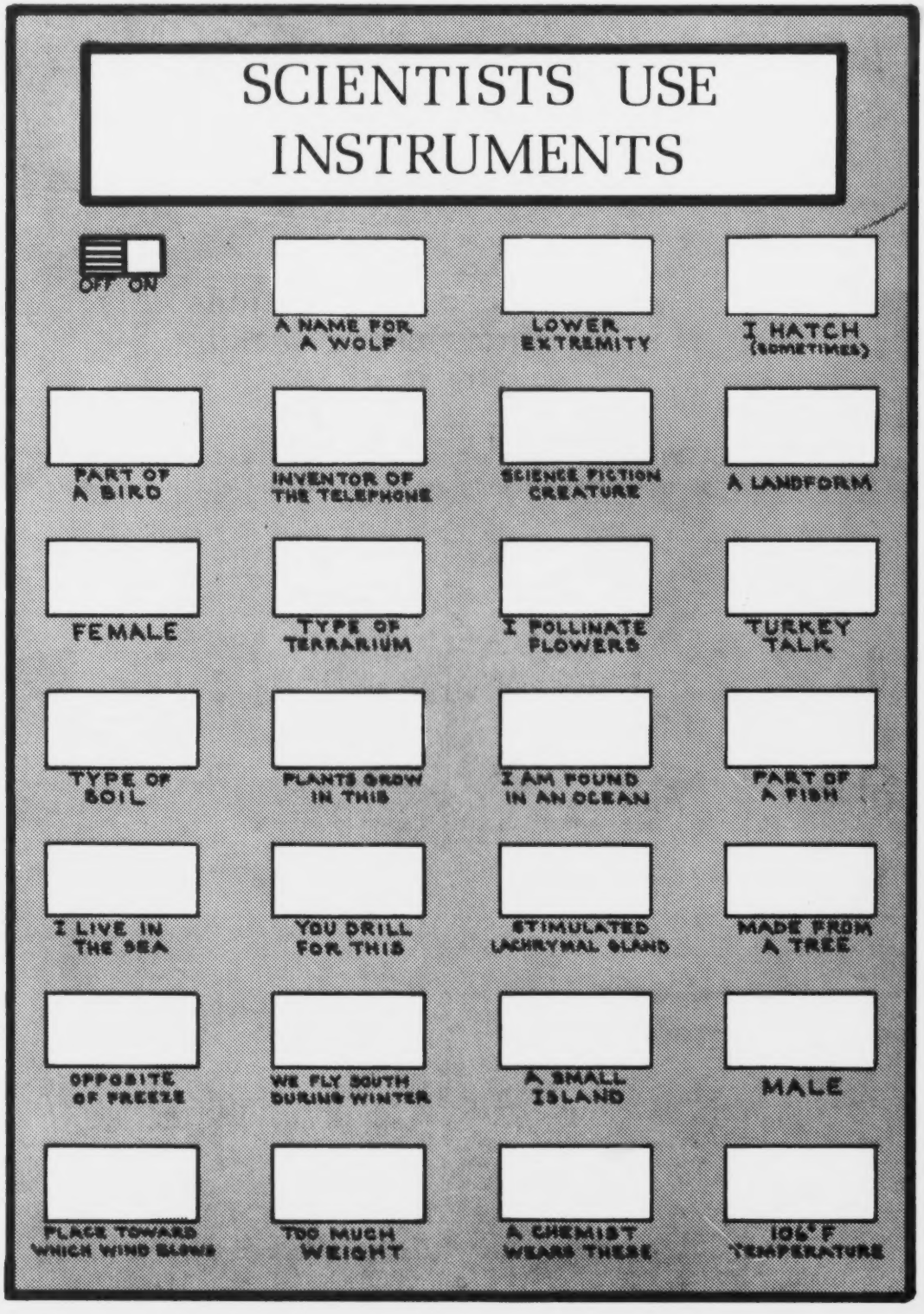
Thank you for reading all the directions before making any marks on this paper. Your final task is to print your name on the computer card above. The letters in your name should be the only marks you make on this paper.

Scientists often use calculators in their work. Enter numeral from column at left into display. Turn calculator upside down to find the science word made by those numerals. Write that word on the calculator button that best matches the description found below the button. Develop your own list of science words made when your calculator is held upside down. Can you take these words and make a message to be sent to outer space?

Ex: $\sqrt{196}$
IS MY GREETING
TO YOU = HI

1. **34**
2. **345**
3. **337**
4. **338**
5. **733**
6. **805**
7. **908**
8. **907**
9. **937**
10. **993**
11. **7105**
12. **7108**
13. **7714**
14. **7718**
15. **7719**
16. **8079**
17. **35339**
18. **378809**
19. **35380**
20. **55307**
21. **5379909**
22. **77345**
23. **31 x 11 x 11**
24. **2 - 1.9193**
25. **8000 - 262**
26. **500 + 200**

27. **BONUS:**
394,752 ÷ 512



IS SCIENCE FOR REAL?

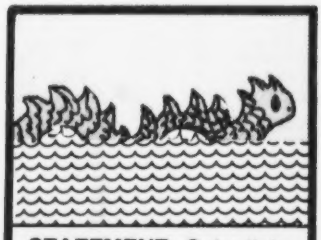
DIRECTIONS: Read the statement below each picture. Then, try to find out if the statement is true or false. In the box below the statement, tell why you think the statement is true or false.

STATEMENT: Lightning does not strike the same place twice.

RESPONSE:

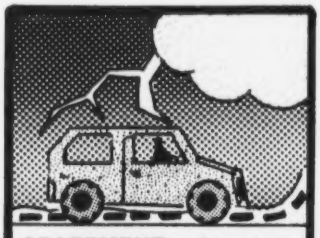
STATEMENT: Scientists have communicated with intelligent beings outside our solar system.

RESPONSE:



STATEMENT: Scientists have seen a real creature called the Loch Ness Monster.

RESPONSE:



STATEMENT: An enclosed automobile is a safe place to be during a lightning storm.

RESPONSE:

STATEMENT: You can get warts by handling toads.

RESPONSE:

STATEMENT: Bears do go to the bathroom when they hibernate.

RESPONSE:

STATEMENT: Unidentified flying objects (UFO'S) have been seen by people on Earth.

RESPONSE:

STATEMENT: Lemmings are known to commit suicide because of changes on Earth.

RESPONSE:

STATEMENT: Scientists speculate that a comet caused huge devastation of a forest in Siberia, Russia in 1908.

RESPONSE:

STATEMENT: Scientists believe that there was a lost continent called Atlantis.

RESPONSE:

STATEMENT: Plants are affected by your talking to them.

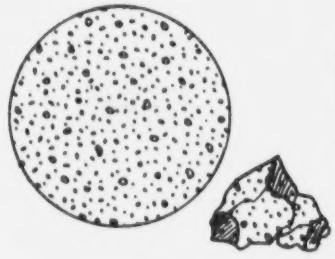
RESPONSE:

STATEMENT: A four-leaf clover will bring you good luck.

RESPONSE:

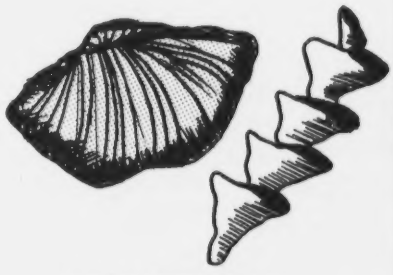
Scientists Study The Old...

Directions: Cut apart the cards below and glue to individual tagboard squares. Rearrange the squares, in order to show the history of man until the first automobile. Glue squares to a large sheet of cardboard showing correct history. Then determine the approximate time in years that it took each development to occur. Study the history of each development and report this to the class.

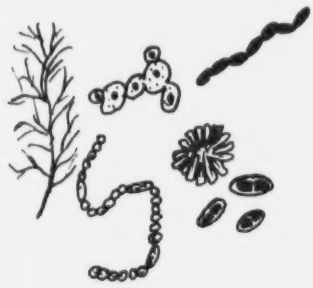


MOON ROCKS

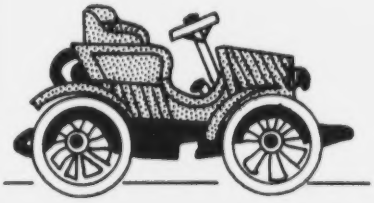
CAVEMAN



FIRST FOSSILS

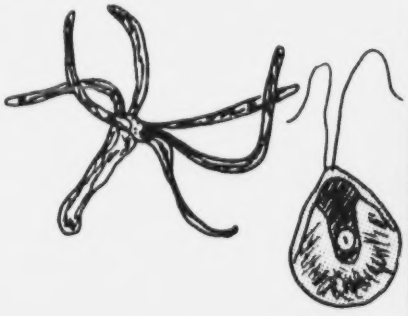


FIRST KNOWN PLANT



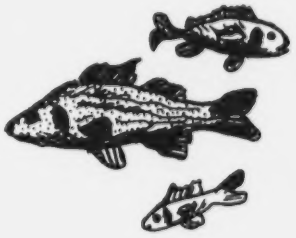
AUTOMOBILE

FIRST HORSE



FIRST KNOWN ANIMAL

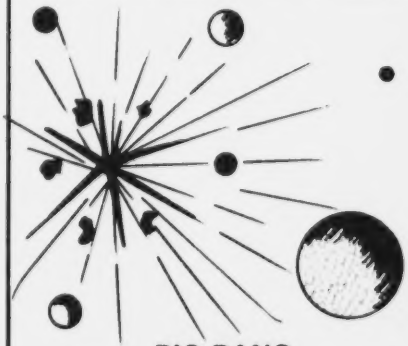
FIRST REPTILES



FIRST FISH

ICE AGE ENDS

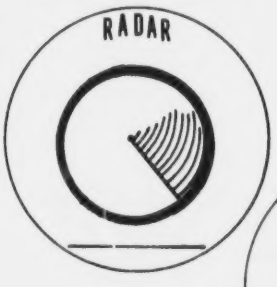
FIRST MAMMALS

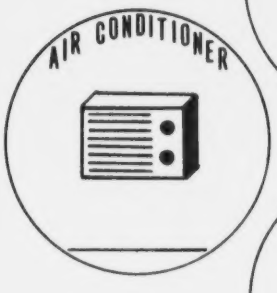


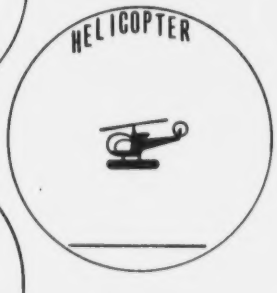
BIG BANG

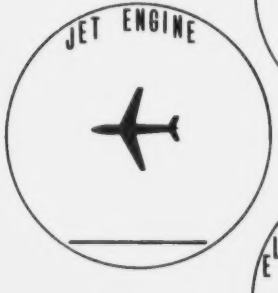
AND DISCOVER THE NEW!

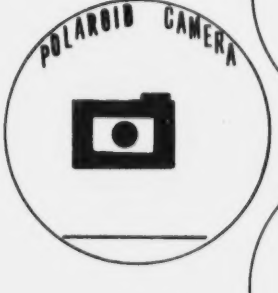
Directions: Draw a line from the picture of the invention or development made since the first car to the discovers name. Then find out the year the invention or discovery was made and write that year on the picture of the invention.

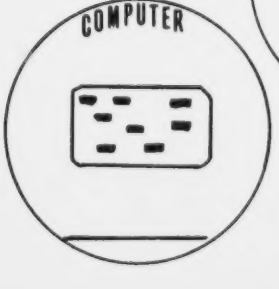




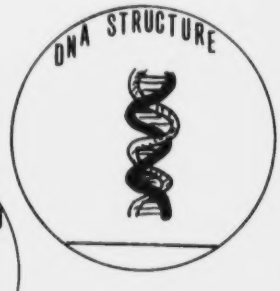


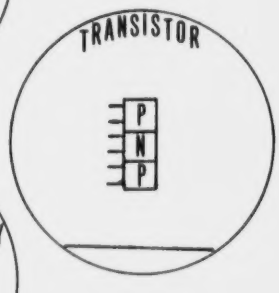


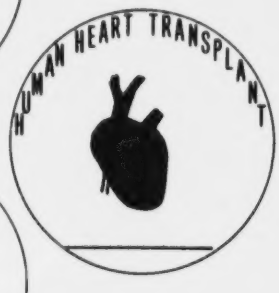


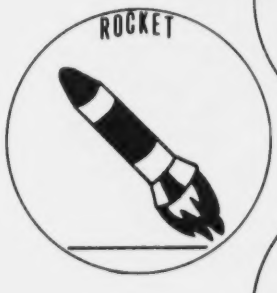


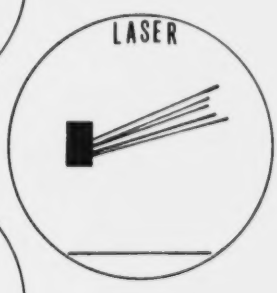
Aiken, et al.
Armstrong
Bardeen, et al.
Barnard
Carrier
Crick
Farnsworth
Goddard
Goldmark
Knoll, Ruska
Land
Midgely
Ohain
Sikorsky
Steptoe
Taylor, Young
Townes, Schawlow
Waller

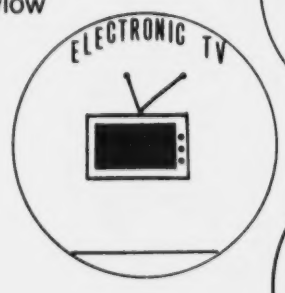


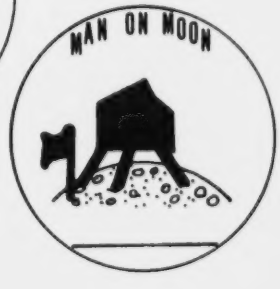




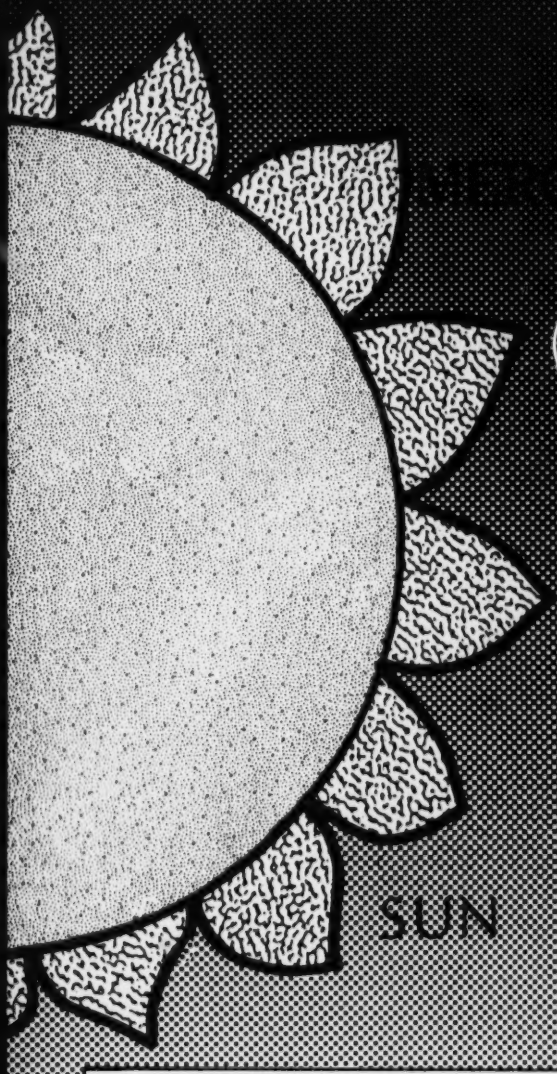




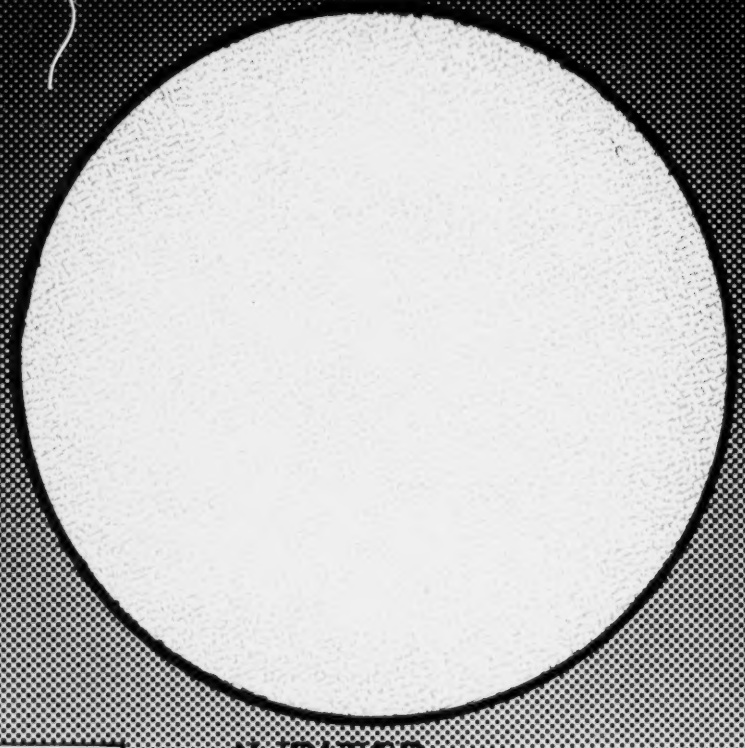




Scientists Observe...



SUN



JUPITER

DISTANCE FROM THE SUN

Sun	
Mercury	2'' (5 cm) from sun
Venus	4'' (10 cm) from sun
Earth	6'' (15 cm) from sun
Moon	6.2'' (15.5 cm) from sun
Mars	9'' (22.5 cm) from sun
Jupiter	30'' (75 cm) from sun
Saturn	60'' (150 cm) from sun
Uranus	120'' (300 cm) from sun
Neptune	180'' (450 cm) from sun
Pluto	240'' (600 cm) from sun

Planetary Things!

URANUS

NEPTUNE

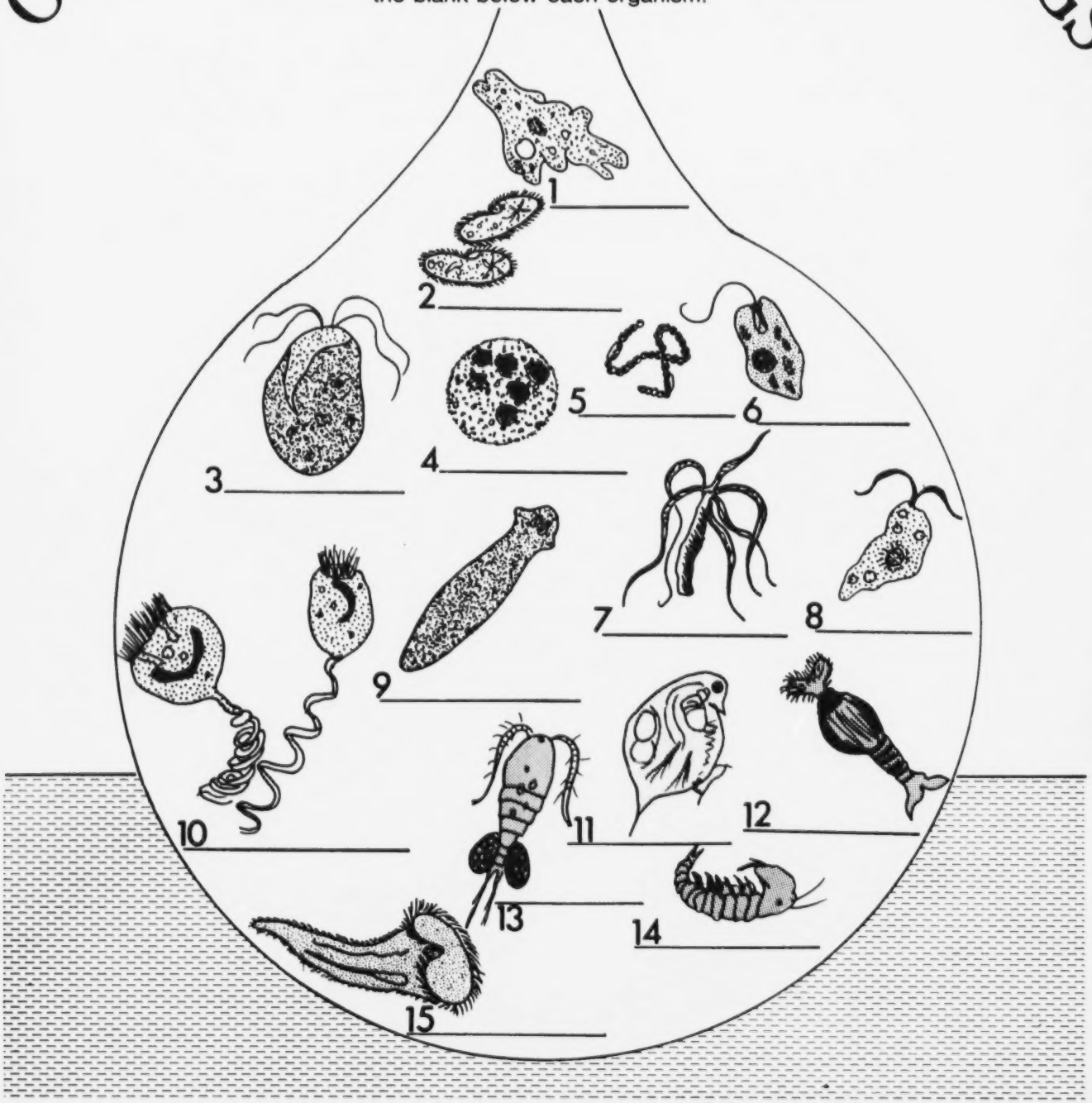
PLUTO

SATURN

Directions: These pictures represent scale drawings of the nine planets in our solar system. Cut out each planet. Glue planets in order to a long piece (20 feet or 6 m) of paper (computer print-out paper works well) with the distances in the chart at the left between each planet. Find out the number of satellites per planet and sketch those in. Then develop a flight plan for Voyager I and Voyager II to view these planets and those found in other solar systems.

SCIENTISTS OBSERVE SMALL, NEARBY THINGS

Directions:
Obtain some water from a quiet pond. Place several drops of water on a microscope slide. Place slide under microscope. Identify the following creatures found in your pond water. Write the name of the organism in the blank below each organism.

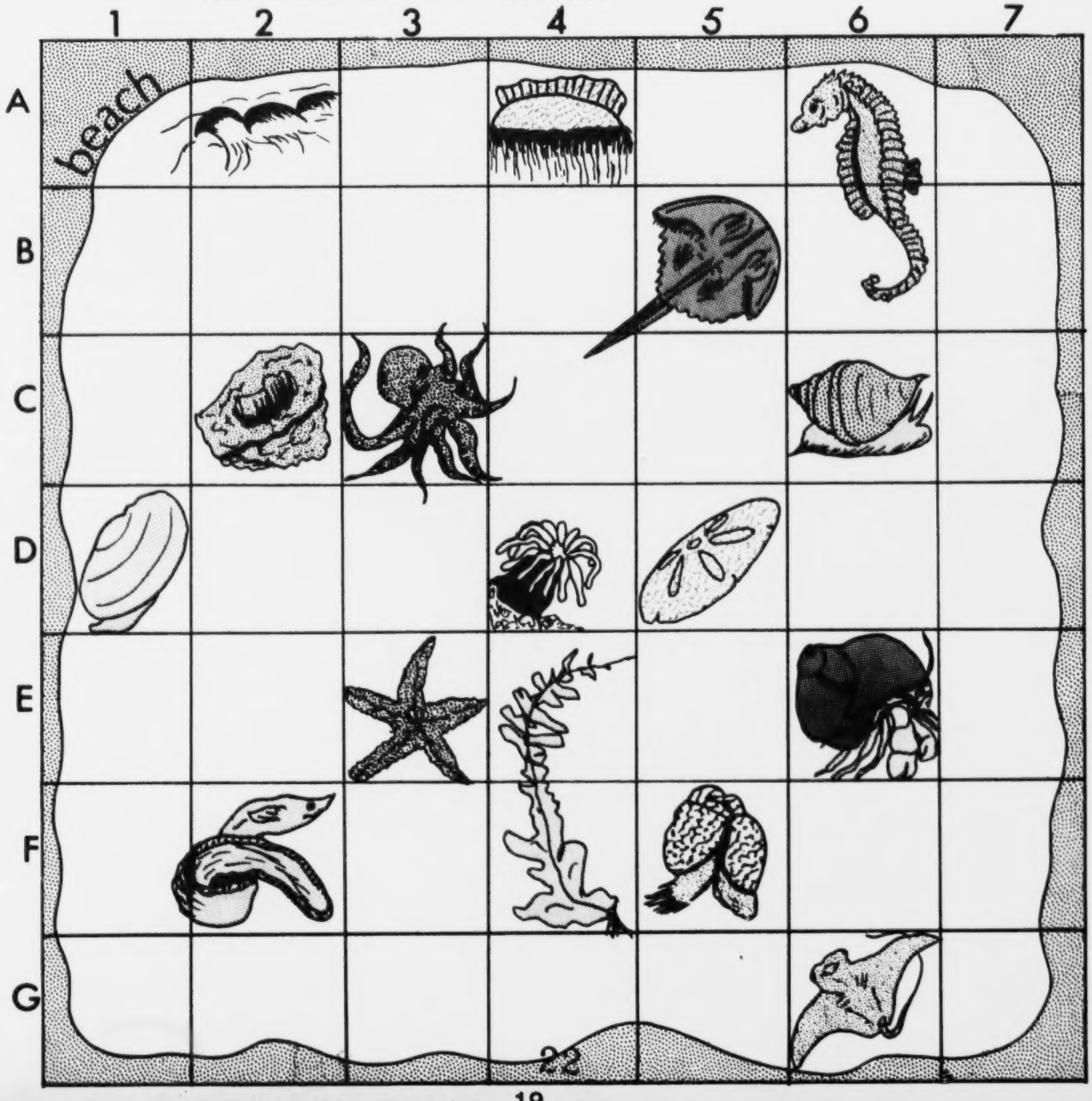


21

SCIENTISTS STUDY THE SEA

Directions: Below is a picture of a large sea contained within a grid. Identify the square(s) on the grid where the following sea creatures or features can be found. Label that creature or feature on the grid. Place names of grid spaces in the blanks below. The first one is done for you.

Name	Grid Space(s)	Name	Grid Space(s)
Beach	A-1	Sand Dollar	
Waves		Barnacle	
Starfish		Oyster	
Kelp		Clam	
Snail		Hermit Crab	
Octopus		Horseshoe Crab	
Sea Anemone		Portuguese man-of-war	
Manta Ray		Eel	
		Sea Horse	



SCIENTISTS STUDY THE EARTH

Directions: Go outside and find at least five different rocks. Label them A, B, C, D and E. Do tests on each rock and complete the charts below. Then cut out the cards below and put them in sequence from softest to hardest rock according to Mohs' Scale of Hardness.

MY ROCK CHART

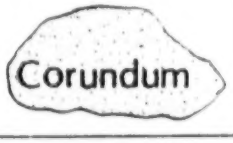
ROCK	COLOR		SHADE	WEIGHT	LAYERS	TEXTURE rough smooth	WRITES yes no	SHINY or DULL	CRYSTALS	VINEGAR ADDED	MOHS* RATING	SPECIFIC GRAVITY	OTHER
	dry	wet											
A													
B													
C													
D													
E													

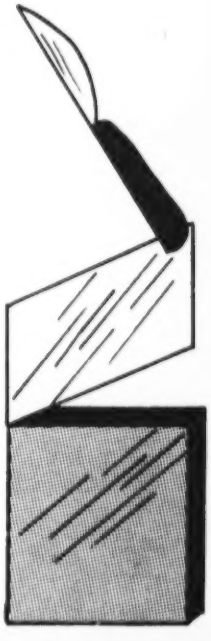
MOHS' SCALE CHART

ROCK	Finger-Nail	Penny	Nail	Knife	Glass	Tile	Color	Other
A								
B								
C								
D								
E								

*MOHS' SCALE OF RELATIVE HARDNESS

MATERIAL	WHAT IT WILL DO	Rating
TALC	so soft it's used for talcum powder	1
GYPSUM	a fingernail will scratch it	2
CALCITE	a copper penny will scratch it	3
FLUORITE	a steel knife will scratch it	4
APATITE	a knife scratches if you press hard	5
FELDSPAR	will scratch a knife blade	6
QUARTZ	will scratch glass (and all previous)	7
TOPAZ	will scratch quartz (and all previous)	8
CORUNDUM	will scratch all except a diamond	9
DIAMOND	will scratch everything	10

A Sketch of my pet rock	Talc	Apatite
Fluorite	Topaz	Gypsum
Calcite	 Corundum	Feldspar
Quartz	Diamond	23



SCIENTISTS OBSERVE THE MOON

Directions: You can see the moon because of reflected sunlight. Use the sketches below to shade in the part of the moon that you can't see -- the other part will be the part lit up by the sun. Write the date on the top line. On the bottom line write the word or words that best describe your feelings while watching the moon. Then find out what phase the moon was in when a record was set in your favorite sports activity.

DATE _____

FEELING _____

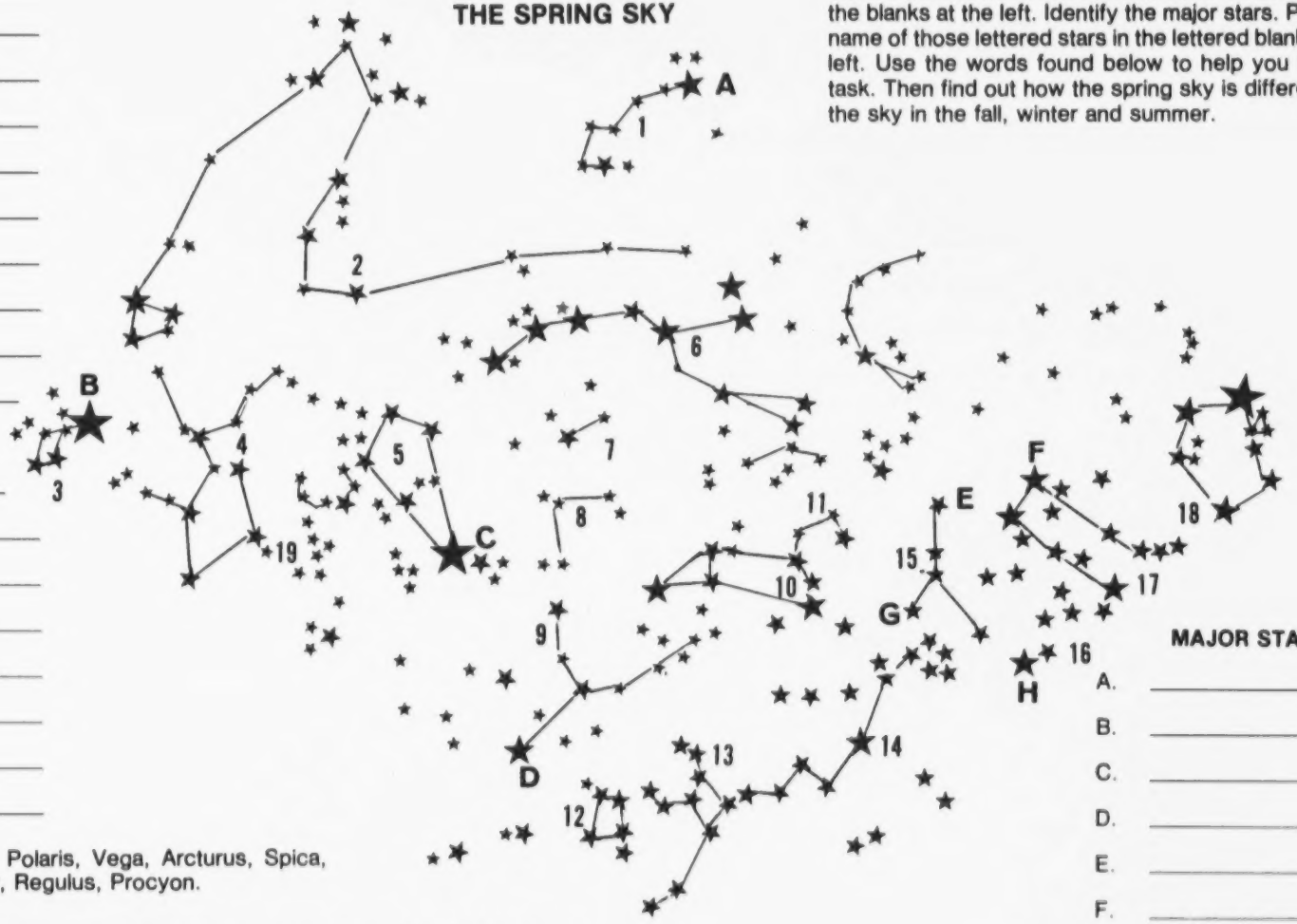
SCIENTISTS STUDY THE STARS

Directions: This is a picture of the Spring Sky. Go outside at night and identify the major constellations of stars. Fill in the names of the numbered constellations in the blanks at the left. Identify the major stars. Place the name of those lettered stars in the lettered blanks at the left. Use the words found below to help you with the task. Then find out how the spring sky is different from the sky in the fall, winter and summer.

MAJOR CONSTELLATIONS

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____

THE SPRING SKY



MAJOR STARS

A. _____
B. _____
C. _____
D. _____
E. _____
F. _____
G. _____
H. _____

Names of Major Stars: Polaris, Vega, Arcturus, Spica, Pollux, Castor, Regulus, Procyon.

Names of Major Constellations: Ursa Minor, Draco, Lyra, Hercules, Bootes, Ursa Major, Canes Venatici, Coma Berenices, Virgo, Leo, Leo Minor, Corvus, Crater, Hydra, Cancer, Canis Minor, Gemini, Auriga, Corona Borealis.

My Daily Weather Record

Directions: Use this handy daily weather record to record weather happenings for at least one month. You'll need four of these to finish your task.

WEEK NUMBER _____ **NAME** _____

Day of Week	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Time of Day							
Temperature: F (or C)							
Wind Direction							
Wind Speed: mph (km/hr)							
Cloud Type							
Cloud Cover							
Precipitation: In.(cm)							
Barometric Pressure: In (cm)							
Relative Humidity							
Dew Point: F (C)							
Air Pollution Index							
Air Pollution Range							
Major Air Pollutant							
Other							

MY FEELINGS

SCIENTISTS STUDY ENERGY USE

Directions: Read your electricity and gas meters each day before you go to bed. Draw an arrow in proper place on dials below. Subtract previous reading from present reading to find daily usage. Determine monthly usage. Find out ways that would help you conserve energy. Share your results with your parents and members of your class.

MY DAILY RECORD BOOK OF ELECTRICITY USE AT MY HOME

Name _____

School _____

Today's Reading _____ kwh

Yesterday's Reading _____ kwh

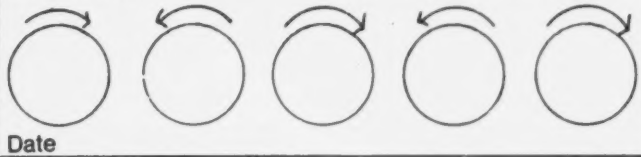
Total kwh used _____

Date

Today's Reading _____ kwh

Yesterday's Reading _____ kwh

Total kwh used _____

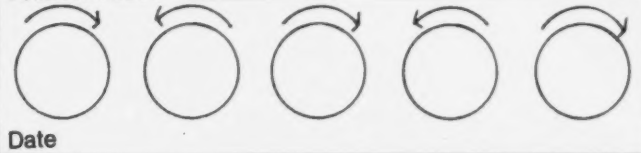


Date

Today's Reading _____ kwh

Yesterday's Reading _____ kwh

Total kwh used _____



Date

Today's Reading _____ kwh

Yesterday's Reading _____ kwh

Total kwh used _____

Date

MY DAILY RECORD BOOK OF GAS USE AT MY HOME

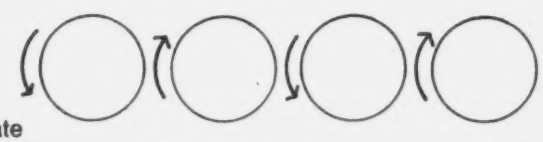
Name _____

School _____

Today's Reading _____ kwh

Yesterday's Reading _____ kwh

Total kwh used _____

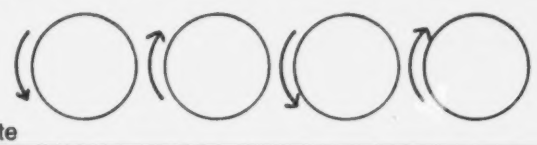


Date

Today's Reading _____ kwh

Yesterday's Reading _____ kwh

Total kwh used _____

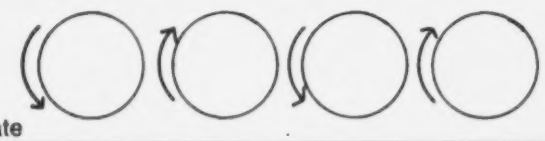


Date

Today's Reading _____ kwh

Yesterday's Reading _____ kwh

Total kwh used _____



Date

Today's Reading _____ kwh

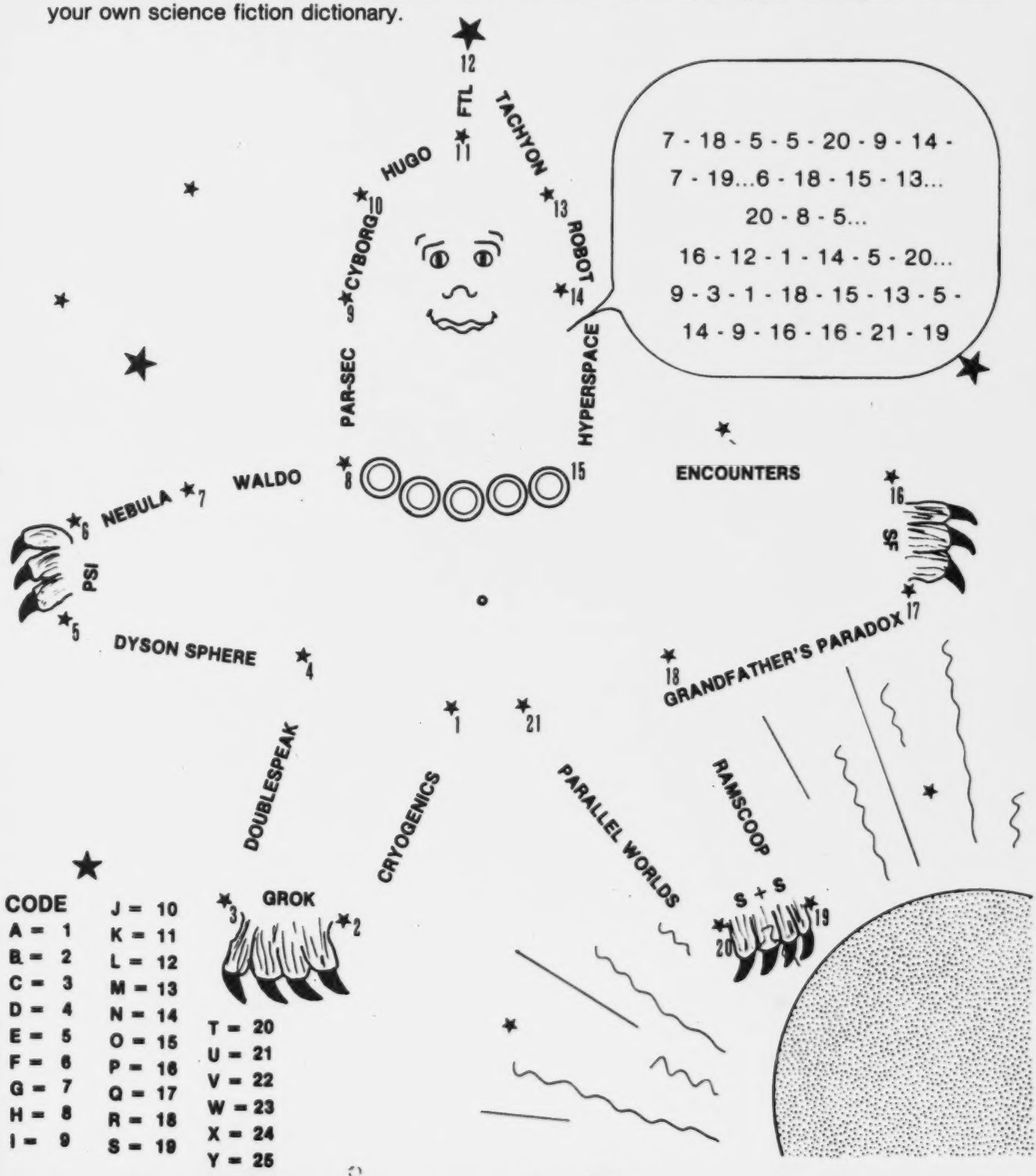
Yesterday's Reading _____ kwh

Total kwh used _____

Date

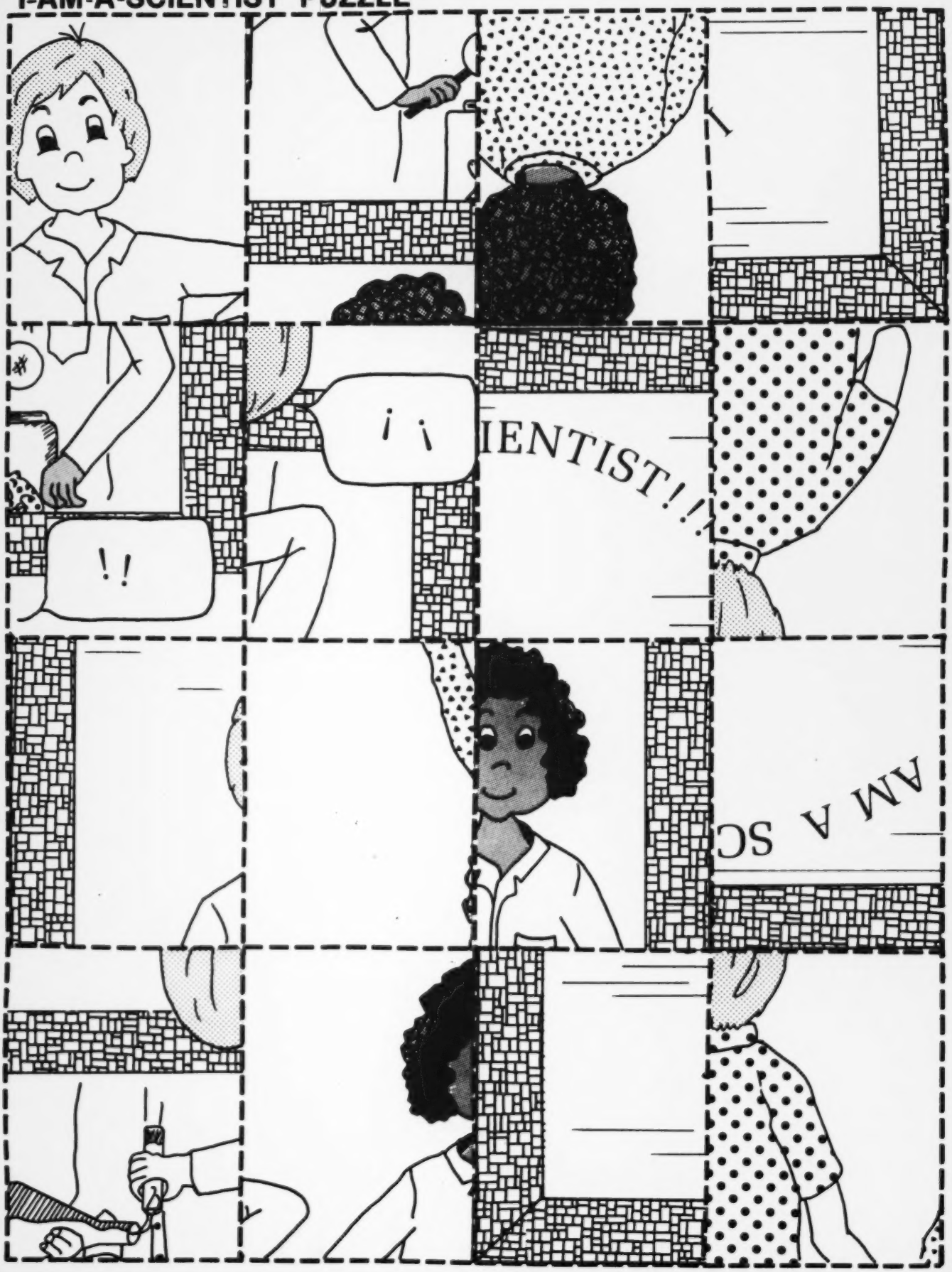
SCIENTISTS LOOK TO THE FUTURE

Directions: Starting from the first star, draw a line that connects all the numbered stars. This will help you identify a special science fiction creature who has just arrived from outer space with a special message. What's so special about your creature's message? Write a response to the creature after decoding the message using the chart below. You may want to look up the meaning of science fiction terms written between the numerals and use these in your message. Then make your own science fiction dictionary.



CODE			
A = 1	J = 10	T = 20
B = 2	K = 11	U = 21
C = 3	L = 12	V = 22
D = 4	M = 13	W = 23
E = 5	N = 14	X = 24
F = 6	O = 15	Y = 25
G = 7	P = 16	Z = 26
H = 8	Q = 17	
I = 9	R = 18	
	S = 19	

I-AM-A-SCIENTIST PUZZLE



TEACHER/PARENT GUIDE

ARE YOU A SCIENTIST ?

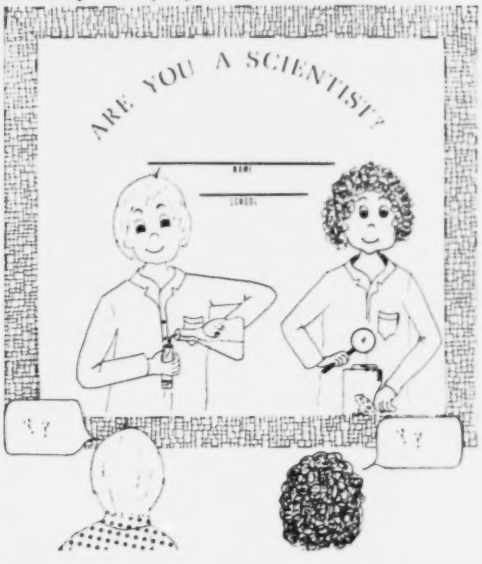
Activity Page Number 2

Concept: development of self-concept and career awareness in science

Materials: scissors, glue, tagboard or cardboard (8½" x 11" from back of writing tablets), one per student

Description: Have children cut the activity sheet into designated 16 squares. Rearrange puzzle pieces to form picture. Glue pieces in place onto tagboard/cardboard. Use as front cover for the Student Booklet. Color cover. Decorate. Add name of student and school to cover. Discuss possible careers in science. Then, make back cover **I AM A SCIENTIST** (activity sheet 26) and tape as a binding to front cover for Student Booklet.

Answers: Completed project that looks like this:



SCIENTISTS ARE CREATIVE

Activity Page Number 3

Concept: encourage creative thinking

Materials: one activity sheet per student, pencils, clock or stopwatch

Description: Supply each student with one activity sheet. Have students stare at insect and tell you what they see (two faces, vase). Discuss what a flip-flop reversal is as first one sees the vase, then the two faces. Then, have students count the number of flip-flops in one minute. Record. Do for short time, one minute per day, to find out if number of flip-flops or reversals increases for each student as he does the activities in this book. Make a class record for teacher-parent use.

Answers: Answers will vary depending on the student's degree of creativity.

SCIENTISTS ARE SPECIAL PEOPLE

Activity Page Number 4

Concept: ocupations in science, career awareness

Materials: one activity sheet per child, pencils

Description: Each child draws a line that connects the name of the scientist to the object that best describes what that scientist studies.

Answers: Lines should connect the following: Geologist with rocks, Paleontologist with fossils, Astronomer with planet, Ornithologist with bird, Meteorologist with cloud and lightning, Physicist with visible spectrum, Botanist with flower, Biologist with frog, Chemist with H^3O molecule, Herpetologist with snake, Oceanographer with ocean, Ichthyologist with fish, Zoologist with paramecium, and My Field with student choice.

SOME SCIENTISTS ARE FAMOUS FOR THEIR WORKS!

Activity Page Numbers 5, 6, 7

Concept: awareness of famous scientists and their scientific discoveries

Materials: one activity sheet per student using activity sheets 3, 4 and 5, glue or rubber cement, scissors, single-layered cardboard or tagboard

Description: Distribute these three activity sheets to each student. Have students cut out cards, making one deck of 13 scientists and one deck of 13 discoveries. Cut 26 pieces of single-layered cardboard or tagboard the size of each card. Glue or rubber cement card to cardboard. Have students find out the name of each scientist and what he is famous for. Write this information under the picture on each card. Laminate for lasting durability. Have children then match the picture of the scientist with the picture of the scientific discovery. Play Concentration with these two decks of cards.

Answers:

Row 1, Master 3 - Charles Richard Drew (human heart surgery), Percy L. Julian (soybean chemistry), George Washington Carver (my work with peanuts and sweet potatoes).
Row 2, Master 3 - Benjamin Banneker (a prominent astronomer), Allen Shepard (first U. S. astronaut who later walked on the moon), Galileo Galilei (discovering telescope).
Row 3, Master 3 - Gail Borden (discovering condensed milk), Marie Curie (discovering element radium and x-ray), Gregor Mendel (plant genetics).
Row 1, Master 4 - Isaac Asimov (writing science fiction), Matthew A. Henson (first man to reach the North Pole), Isaac Newton (gravity and motion).
Row 2, Master 4 - Nicolaus Copernicus (father of modern astronomy).

THINGS SCIENTISTS DO

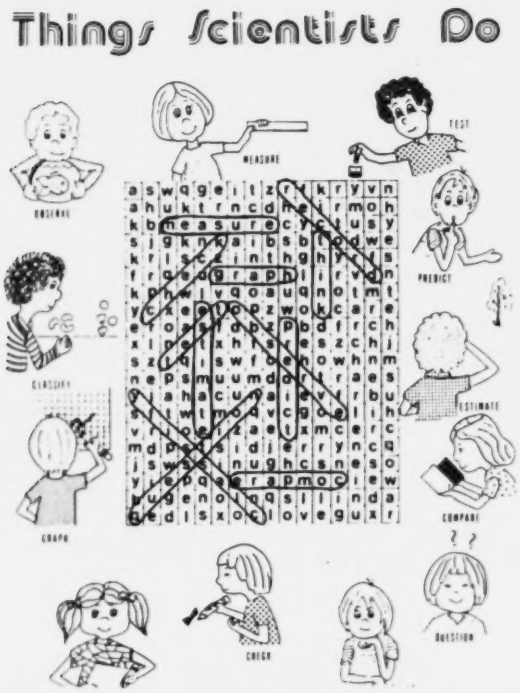
Activity Page Number 8

Concept: awareness of the processes of science

Materials: one activity sheet per student, pencils

Description: This word search will help children gain an understanding of what a scientist actually does. Children circle the words or the scientific processes in the word search. Words may go up, down, diagonally, backwards and forwards. Discuss each scientific process. Then, have children act out what the process is to other members in the class. Have members guess what that process is. Have youngsters actually practice these scientific processes in their everyday lives.

Answers: Correct answer page should look like the one below:



SCIENTISTS STRETCH THEIR MINDS

Activity Page Number 9

Concept: divergent thinking

Materials: one activity sheet per student, pencils, blank playing cards or discarded computer cards

Description: Distribute one activity sheet per student. Do number one with students. Have students complete exercise. Discuss how scientists think of all possibilities in their work and how athletes develop mind sets for top performance. Have students develop their own mind stretchers. Place on blank computer cards. Laminate for lasting durability.

Answers: 1. Mind Over Matter, 2. Space Program, 3. Three Degrees Below Zero, 4. Short Wave Radio, 5. Deer Crossing, 6. Smallpox, 7. A Little Out of Breath, 8. Man in a Moon, 9. $E = MC^2$, 10. Neon Light, 11. Scrambled Eggs, 12. Right Between the Eyes, 13. Zero Gravity, 14. X-ray, 15. Close Encounters of the Third Kind, 16. Outer Space, 17. Double Vision, 18. 6:00 a.m. or Ambush, 19. Once Upon a Time

SCIENTISTS REMEMBER MANY THINGS

Activity Page Number 10

Concept: mnemonic devices to aid memory, scientific discoveries

Materials: one activity sheet per student

Description: Children can develop their own mental faculties through the use of mnemonic devices much like scientists in the past have done with the use of a telephone dial. Have children match the scientists with their telephone numbers and the descriptions of the scientists and what they are famous for.

Name	Mnemonic Device	Tel. No.
Neil Armstrong	Moon Man	666-6626
George W. Carver	Peanuts	732-6887
John James Audubon	Birdman	247-3626
Alexander Graham Bell	Wrong No.	976-6466
Hans Oersted	Magnets	624-6387
Marie Curie	Lab Lady	522-5239
Carl Sagan	Planets	752-6387
Rachel Carson	Poisons	764-7667
Benjamin Franklin	Bifocal	243-6225
Percy Julian	Soybean	769-2326
Margaret Mead	Anthros	268-4767
Watson-Crick	DNA Coil	362-2645
Robert Goddard	Rockets	762-5387

SCIENTISTS FOLLOW DIRECTIONS, CAN YOU ?

Activity Page Number 11

Concept: the importance of following directions to achieve a desired result in science

Materials: one activity sheet per student, one pen per student

Description: This exercise teaches children the importance of following directions in science. Give one activity sheet to each student. Stress the use of pens so children cannot erase. If any children ask for equipment, such as rulers and crayons, give them the equipment. Have

children turn papers over on desks when finished. Discuss the importance of following directions without identifying who did the exercise correctly or incorrectly. Collect all papers and tally correct/incorrect responses. This gives excellent feedback to the teacher. The exercise is not meant to embarrass children in any way, so handle the exercise in a positive manner. Discuss safety procedures found in the pictures of adding acid to water, not water to acid. Discuss other safety precautions taken in science.

Answers: Only the child's name should appear on the computer card. No other marks should be on the paper.

SCIENTISTS USE INSTRUMENTS

Activity Page Number 12

Concept: instrumentation in science and mathematics, scientific vocabulary

Materials: calculators, pencils, dictionary, one activity sheet per student

Description: Use this as a small group activity. Do example first. Then, have children do the exercise. Use dictionary if needed. Have students develop their own lists of science words. The lists can be posted in the classroom in a "Calculator Corner."

Answers: Example: HI

1. HE	10. EGG	19. OBESE
2. SHE	11. SOIL	20. LOESS
3. LEE	12. BOIL	21. GOGGLES
4. BEE	13. HILL	22. SHELL
5. EEL	14. BILL	23. ISLE
6. SOB	15. GILL	24. LOBO
7. BOG	16. GLOB	25. BELL
8. LOG	17. GEESE	26. OIL
9. LEG	18. GOBBLE	27. ILL

IS SCIENCE FOR REAL ?

Activity Page Number 13

Concept: distinguish between science and superstition, myths and scientific facts, and demonstrate the tentativeness of science

Materials: one activity sheet per student, pencils, reference materials

Description: Hold class discussion on superstitions such as the numeral 13, black cats, and walking under a ladder. Give children activity sheets. Encourage research to determine if each statement is a scientific fact or superstition, true or false.

Answers: Accept all answers to show tentativeness of science. What may be considered true today may not be true tomorrow. Here are some sample responses.

Row 1: No. 1, false. Lightning can strike the same place twice. No. 2, false. Attempts are being made, however, through Voyager I and II and Pioneer 10 and 11. No. 3, false. There hasn't been any physical evidence found that would show that a Loch Ness Monster exists. No. 4, false. Steel belted tires may make an automobile an unsafe place to be during a storm.

Row 2: No. 1, false. No scientific evidence to prove this; warts are caused by a virus. No. 2, true. There is a small amount of waste material due to body processes slowing down but there is controversy whether bears hibernate at all. No. 3, false, but there is a great deal of controversy on this topic. No physical evidence discovered yet. No. 4, true. Lemmings do commit suicide during certain periods of the year.

Row 3: No. 1, true, but there is a great deal of speculation on this topic. No. 2, false, but there is a great deal of speculation on this topic. No. 3, true or false. Recent research indicated that there is a strong possibility that this is true, but a great deal of controversy continues to surround this topic. No. 4, false. There is no scientific support for this statement.

SCIENTISTS STUDY THE OLD . . .

Activity Page Number 14

Concept: possible history of man, Earth, and major developments in science

Materials: one activity sheet per student, tagboard, scissors, glue, copy of *Dragons of Eden* by Carl Sagan, published by Random House, Inc., New York, NY, 1977.

Description: Discuss how Earth may have come about and how man may have evolved. Have children cut out squares and rearrange them to show the history of man until the first man-made automobile. Glue squares to tagboard, showing correct order of development. Determine the approximate time in years during which each development may have occurred.

Answers: The correct sequence should be as follows: big bang, moon rocks, first known plant, first known animal, fossils, fish, reptiles, horse, mammals, caveman, Ice Age ends, automobile.

AND DISCOVER THE NEW!

Activity Page Number 15

Concept: old discoveries are modified to make new discoveries

Description: Discuss recent discoveries made in science. These may include discoveries such as computers and rockets. Have children draw a line that connects the name of the person with the discovery. Then have children find out in what year the discovery was made and place that year in the blank under the discovery.

Answers: Lines should connect the following:

Discovery	Person(s)	Date
Radar	Taylor, Young	1922
Long playing record	Goldmark	1948
Air conditioner	Carrier	1911
1st test tube baby	Steptoe	1978
DNA structure	Crick	1951
Gasoline	Midgely	1922
Transistor	Bardeen, et al.	1947
Helicopter	Sikorsky	1939
Jet engine	Ohain	1939
Electron microscope	Knoll, Ruska	1931
Heart transplant	Barnard	1967
Polaroid camera	Land	1948
Rocket	Goddard	1929
Laser	Townes, Schawlow	1958
Panoramic movie	Waller	1952
Electronic TV	Farnsworth	1927
Computer	Aiken, et al.	1939
Man on moon	Armstrong	1969

SCIENTISTS OBSERVE LARGE, FAR AWAY THINGS!

Activity Page Number 16, 17

Concept: relative sizes and distances of planets in the solar system

Materials: one activity sheet per student, scissors, glue, butcher paper, freezer paper, or old computer print-out booklets

Description: Give children copies of both activity sheets. Review order of planets and the missions of Voyagers I and II. Have children work as individuals or in small groups to make this scale model solar system. Children will need to cut out each planet, measure the distance between each and glue to roll of paper. The size of each planet is already in scale relative to other planets. Check accuracy of measurement for the distance of each planet from the sun. Have children print information from the chart onto paper. Develop title, legend, etc. Then, have children do research on the physical characteristics of each planet. Plan a visit to each planet. Add your favorite music as part of the trip. Find out what is beyond our solar system and how Voyagers I and II may answer this question.

Answer: completed model with appropriate distances from the sun to the planets

SCIENTISTS OBSERVE SMALL, NEARBY THINGS

Activity Page Number 18

Concept: identification of microorganisms

Materials: pond water, regular tap water, microscopes, eyedroppers, cover slips, wax paper, newspapers, one activity sheet per student, reference books

Descriptions: Introduce microscope to students by having them place one drop of regular tap water on wax paper over newspaper. Note magnification of letter on newspaper by the drop of water acting as a lens. Introduce pond water. Have students identify as many creatures as possible in the water. Then, have youngsters use reference books to identify other organisms found in the water. Make sketches of these organisms.

Answers: 1. amoeba; 2. paramecium; 3. tetramitus; 4. volvox; 5. algae; 6. euglena; 7. hydra; 8. chilomonas; 9. planaria; 10. vorticella; 11. daphnia; 12. rotifer; 13. cyclops; 14. brine shrimp; 15. stentor.

SCIENTISTS STUDY THE SEA

Activity Page Number 19

Concept: identify marine organisms and features by use of a grid

Materials: one activity sheet per student

Description: Discuss the role of an oceanographer in science. Give each child an activity and various oceanography materials such as shells. Do example with students. Discuss how a grid words. Complete activity sheet. Extend activity by making an oceanography bingo game using the grid squares on the activity sheet.

Answers: beach-A1; waves-A2; starfish-E3; kelp-EF4; snail-C6; octopus-C3; sea anenome-D4; manta ray-G6; sand dollar-D5; barnacle-F5; oyster-C2; clam-D1; hermit crab-E6; horseshoe crab-B5; Portuguese man-of-war-A4; eel-F2; sea horse-AB6.

SCIENTISTS STUDY THE EARTH

Activity Page Number 20

Concept: identification of rocks and minerals, Mohs' Scale of Hardness

Materials: one activity sheet per student, rocks, nail, penny, knife, glass, tiles, and vinegar

Description: This activity allows children to identify various rocks according to their characteristics. Caution should be taken when using knife or glass. Ceramic tiles can be used as streak plates for this activity. Students should sketch types of crystals found in each rock.

Answers: talc, gypsum, calcite, fluorite, apatite, feldspar, quartz, topaz, corundum, diamond.

SCIENTISTS OBSERVE THE MOON

Activity Page Number 21

Concept: eight phases of the moon - new moon, new crescent, first quarter, waxing gibbous, full moon, waning gibbous, last quarter, old crescent

Materials: one activity sheet per student, black and yellow marking pens, cardboard (pizza wheels)

Description: Cut 8 equal-sized circles of cardboard. Shade in dark part of moon with black marker, lighted part with yellow marker. Discuss 8 phases of moon and the positions of the sun, moon and Earth during each phase. Discuss how the moon is reflected sunlight and where the sun must be located in order to light up that part of the moon. Give students activity sheets and have them record both the shapes of the moon and their feelings for one month while observing the moon.

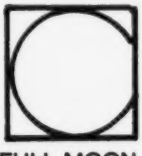
Answers: Answers will vary but your moon phases should look like this over a one month's time span:

NEW MOON
moon not visible

NEW CRESCENT

FIRST QUARTER

WAXING GIBBOUS



FULL MOON

WANING GIBBOUS

LAST QUARTER

OLD CRESCENT

SCIENTISTS STUDY THE STARS

Activity Page Number 22

Concept: major constellations and stars

Materials: one activity sheet per student, pencils

Description: This exercise helps students identify major constellations and stars found in the spring sky. Give each student one activity sheet. Have youngsters go outside at night to identify the celestial bodies. Reference books can also be used. Extend this activity to fall, winter and summer skies. Myths for each constellation can also be studied, written, and dramatized.

Answers: Major Constellations include: 1. Ursa Minor; 2. Draco; 3. Lyra; 4. Hercules; 5. Bootes; 6. Ursa Major; 7. Canes Venatici; 8. Coma Berenices; 9. Virgo; 10. Leo; 11. Leo Minor; 12. Corvus; 13. Crater; 14. Hydra; 15. Cancer; 16. Canis Minor; 17. Gemini; 18. Auriga; 19. Corona Borealis.

Major Stars include: A. Polaris; B. Vega; C. Arcturus; D. Spica; E. Pollux; F. Castor; G. Regulus; H. Procyon.

SCIENTISTS STUDY THE WEATHER

Activity Page Number 23

Concept: daily weather patterns over a period of time

Materials: four copies of one activity sheet per student, possible cover for weather booklet, stapler, weather map, weather facts and weather figures from previous day's newspaper

Description: Give each student four copies of activity sheet and one cover. Staple cover to activity sheets. Decorate. Identify and discuss weather symbols found at top of activity sheet. Record weather facts taken from previous day's newspaper onto chart. Have student record weather facts for one month to note changes in weather patterns. Then, have students make a tape of weather predictions for the following month's weather. Play to class to see if predictions were accurate.

Answers: Answers will vary depending on geographic location and the season of the year.

SCIENTISTS STUDY ENERGY USE

Activity Page Number 24

Concept: recording of, and reducing of, electrical and gas consumption

Materials: one electrical and one gas cover sheet per student, thirty small daily record sheets per child, stapler

Description: Run off copies of covers and daily record sheets as needed. Have students cut pages apart and make booklets. Staple. Enter name of student and school. Explain to students that they will be reading their electricity and gas meters at home each day for one month. Show them how to read both meters and how to calculate daily consumption of electricity and gas. (A real meter or meter dials made from pizza wheels or triple-wall-cardboard work well for this.) Keep record of consumption for one month and share results with class. Extend to the study of other ways to help conserve energy.

Answers: Answers will vary.

SCIENTISTS LOOK TO THE FUTURE

Activity Page Number 25

Concept: futurism

Materials: one activity sheet per student

Description: Discuss the Pioneer 10 and 11 and the Voyager I and II space missions into the depths of interstellar space. Give one activity sheet to each student. Complete exercise. Design own creature. Send a message to other civilizations. Include favorite music as part of message.

Answers: GREETINGS FROM THE PLANET ICAROMENIPPUS

Note: ICAROMENIPPUS is a document written in 100 A.D. by Lucian of Samosata that describes trips to the moon.

I AM A SCIENTIST

Activity Page Number 26

Concept: reflections on self-concept and career awareness in science

Materials: scissors, glue, tape and stiff cardboard (8½" x 11") from back of writing tablets or tagboard; one per student

Description: Have children cut activity sheet into designated 16 squares. Rearrange puzzle pieces to form picture. Glue pieces in place onto cardboard. Use as back cover for Student Booklet. Tape to front cover. Color cover. Decorate. Discuss possible careers in science. Use in conjunction with activity sheet number one.

Answers: Completed project should looks like this:

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